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ABSTRACT

Research indicates that computer-mediated communication (CMC) is a great motivator of learning for the student (e.g., Gatlin-Watts, Arn, & Kordsmeier, 1998). However, the author's experience communicating with students through the Web indicates very divided student reactions to this manner of communication. In view of a relative lack of literature in the area, this research investigates undergraduate students' reactions to the Blackboard-facilitated CMC, their understanding of the potentials, problems, and improvement of this CMC, and possible factors that contribute to the mixed student reactions to the CMC. The population for this study was the nearly 100 students involved in the author's teaching which uses the e-learning technology of Blackboard. This study finds that students do not embrace CMC with ready willingness since they do not perceive CMC as effective as what is suggested in the literature. The study also revealed many practical difficulties involved in the use of CMC technology. (Contains 16 references and 2 tables of data.) (RS)

An Investigation of Mixed Student Reactions to CMC for Instructional Purposes

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Abstract

Research indicates that computer-mediated communication (CMC) is a great motivator of learning for the student (e.g., Gatlin-Watts, Arn, & Kordsmeier, 1998). However, my experience communicating with students through the Web indicates very divided student reactions to this manner of communication. In view of a relative lack of literature in the area, this research investigates students' reactions to the Blackboard™-facilitated CMC, their understanding of the potentials, problems, and improvement of this CMC, and possible factors that contribute to the mixed student reactions to the CMC. Population for this study was the nearly 100 students involved in my teaching which uses the e-learning technology of Blackboard™.

An Investigation of Mixed Student Reactions to CMC for Instructional Purposes

Investment in technology seems to be increasing virtually in every college and university in this nation. Technological updating and reinforcing is certainly among the top priorities on administrators' agenda. Yet technology here is not in its broad sense, meaning technology that includes human inventions such as the chalk or the pencil. The word "technology" is, probably in the majority of modern ears, automatically and immediately translated into the image of computer technology, more specifically communication technology via the instrument of the computer.

The fanfare for technological investment, however, does not seem to be balanced with a healthy amount of careful and imperturbable investigation of the actual and comprehensive effects of CMC in higher education. For instance, much research

indicates that CMC is a great motivator of learning for both the instructor and the student (e.g., Gatlin-Watts, Arn, & Kordsmeier, 1998). My experience communicating with students via computer technology reveals very divided reactions from the students. The intention of this study is to contribute to the amount of investigation of the actual and comprehensive effects of CMC for instructional purposes. First, I will give a brief overview of recent literature on the topic. Second, I will explain the population and the methods employed for this study. Third, I will report results from the survey, including both students' reactions and suggestions to the CMC involved in my instruction and possible factors contributing to such reactions. Finally, implications from the results are discussed.

LITERATURE REVIEW

There is a great amount of literature explaining and espousing the benefit and potential of CMC for educational purposes. Some experts believe that CMC can revolutionize traditional methods for education in the same manner that the tractor transformed agriculture and the airplane transformed transportation (McKeown, 1991). CMC is able to provide education in much the same way that society provides entertainment on a daily basis (MacLean, Peterson, & Ackerman, 1995). Holden & Holms (1995) believe that the information provided via computer technology has an extra advantage in that it can be geared to match the student's capabilities. Thus, as Van Horn (1991) points out, CMC can solve many of the problems facing teachers today. For instance, the teacher is expected to have a large knowledge base and to be responsible for deciding whether to teach at the low end or the high end of the grade level. Many teachers compromise and teach at the middle level, hindering optimal instruction for

many students. The interactive computer programs let each student proceed at his or her own pace, not frustrating the low-level student or boring the achiever (McKeown, 1991). In this sense, computers enable teachers to customize instruction for each student (McKeown, 1991). Gatlin-Watts, Arn, & Kordsmeier (1998) contend that CMC offers much flexibility for the instructor who can customize presentations by adding or subtracting information. They also believe that CMC offers traditional pedagogy some sorely needed "pizzazz," one of which is the ability to motivate both the student and the instructor.

Scifres, Gundersen, & Behara (1998) believe that computer technology can greatly enhance student-teacher communication. This can be accomplished through a variety of manners: list servers for ongoing discussion of classroom issues, providing course information via Web pages and electronic mail, and disseminating assignments and grades via electronic mail, and the use of the Internet as a resource in students' regular course assignments. Furthermore, because of its ability to transcend time and space, CMC can also enhance group collaboration among members who are geographically dispersed (Scifres, Gundersen, & Behara, 1998). These scholars also hypothesize that electronic group members will spend a greater percentage of their time communicating than conventional group members, and that electronic group members will have an improved perception of their group and learning experience than conventional group members.

Because of the scholarly espousal of CMC, the use of this mode of communication easily dwarfs its application in the general society (Lane, & Shelton, 2001). Terms such as e-mail, chat rooms, web page, bulletin board, and even "LOL" are even becoming a

tacit test of one's technological sanity. Some may feel that ignorance of such terms reduces them into the undesirable obscurity. A university campus not equipped with computers is worried about being perceived as "abnormal" and outdated and thus forsaken by students, faculty, and administrators (McCollum, 1998b). Many colleges and universities are eagerly investing, if capable, in the creation of human and technological resources to facilitate use of CMC for their students (Kunde, 1998). In general perception, faculty's knowledge and use of such technology would certainly benefit one's tenure and promotion. Faculty are even required to use such technology (Perlstein, 1998). The promotion of the use of CMC and the Internet is obviously on the increase and widely espoused (Lane & Shelton, 2001).

However, as I mentioned earlier in this paper and as contended by Lane & Shelton (2001), there is an imbalanced research regarding CMC for educational purposes. Lane & Shelton (2001) enumerated a long list of literature as proof of this imbalance. Most communication research "has focused on the positive aspects of CMC" (Dsilva et al., 1998, p. 180). "Scholarly attention to CMC and its use in the undergraduate communication classroom escalates almost daily" (Shelton, Lane, and Waldhart, 1999, p. 234). "Communication educators are being challenged to incorporate Internet- and World Wide Web-based communication technologies into the classrooms, both to enhance pedagogy and to prepare students to compete in competitive job markets" (Witmer, 1998, p. 162). Some scholars, such as Lont (1997), even go a step further by advertising computer technology as a means to increase face-to-face interaction.

The most telling representation of the communication discipline's unquestioning embrace of CMC, according to Lane & Shelton (2001), can be seen through the 1994

special issue of *Communication Education* devoted to the Internet. In his introduction to the issue, Phillips (1994) contends that "Contemporary technology has provided each of us with a private library and as time goes on and the super highway becomes truly international those who are not on it will be literally left behind in the search for knowledge" (p. 72). Santoro (1994) proclaims, "The Internet is quite possibly the most important technical creation since the computer itself" (p. 73). Berge (1994) concludes his contribution to the special issue by emphasizing the superiority of CMC to traditional face-to-face interaction: "Netgroups often serve as powerful tools in the retrieval and exchanging of information, bringing together persons with similar interests regardless of geographic distance or the time constraints dictated by face-to-face meetings" (p. 111). McComb's (1994) contribution to the special issue is totally to lay out, in detail, the benefits of CMC in the college classroom.

As a remedy for the imbalanced research on CMC, Lane & Shelton (2001) make the following suggestions: (1) there should be increased evaluation of the pedagogical benefits of CMC, (2) evaluation of practical usage and access concerns should be based on and compared with what actually takes place in the classroom, and (3) attention to practical and evaluative concerns must be incorporated at the classroom level. This work is making an effort to follow these suggestions by Lane & Shelton (2001). For this purpose, this work investigates students' perception of the effectiveness of CMC in assisting their course learning, possible factors contributing to such perceptions, and problems and recommendations that students experience and suggest after their experience.

METHODS

Background Information

I have been using Blackboard™ (http://cde.sshe.edu:8082/) to assist my teaching for three semesters. Virtually all my course materials that I give to students in class are simultaneously available online. Blackboard™ has the following communication tools: electronic mail, discussion board, virtual classroom, file exchange, and digital drop box. The virtual classroom function, with the help of audio and video equipment, enables participants to engage in synchronous textual, audio, and visual communication. The monitor screen, in this case, literally serves as the "blackboard" on which the instructor can make any writing or drawing, or borrow easily from any website and make marks and revisions to that website. The file exchange function, as the term indicates, enables participants to exchange files among themselves and with the instructor. With the digital drop box, students can electronically submit any type of file to the instructor. All these communication tools are available for use within a group. That is, the student is able to electronically communicate, via these tools, with any member within their project group. Blackboard™ is password protected so that students need to electronically register themselves to be able to access it.

With the previous discovery that students need some incentive to initiate fuller use of the technology, I required, last semester, that every student of mine register to the website. I made it clear that I would incorporate their activity with the website into their course grade (Blackboard™ has the ability to automatically record each registered visitor's activity with different areas of the website). At one point, I specifically asked the students to participate in an online discussion, using the discussion board. In the first

class of the semester, I offered an actual demonstration of the different areas and functions available on Blackboard™ and how to register to be able to use it.

Subjects and Procedure

Respondents to the survey for this study were all the undergraduate students I was teaching last semester. The survey was administered in class except for about 10 students who responded to the survey electronically. I was able to collect 70 responses from a total of 90 students. Twenty-seven of the respondents (38.6) were male and 43 female (61.4%). Thirty-three were freshmen (47.1%), 17 sophomores (24.3%), 13 juniors (18.6%), and 7 seniors (10.0%). In terms of race, 39 were Caucasian (55.7%), 4 African-American (5.7%), 2 of other races, and 25 respondents did not report their race (35.7%). In terms of residence location, 39 lived on campus (55.7%), 22 off campus but within 15 minutes (31.4%), and eight off campus and beyond 15 minutes (11.4%). Fifty-six respondents had access to the Internet at their residence (80.0%), and 14 did not have the access (20.0%). In terms of the frequency in accessing the Internet, 46 (65.7%) did it on a daily basis; 19 did it about one or two times a week (27.1%), four did it about one or two times a month (5.7%), and one almost never did it (1.4%). In terms of the use of the course website as a facilitative communication instrument, 67 (95.7%) were registered to the password-protected website, and 65 (92.9%) registered themselves during the first quarter of the semester. Forty-six respondents (65.7%) accessed the course website on a daily basis, 18 did it about one or two times a week (25.7%), three did it about one or two times a month (4.3%), and three almost never did it (4.3%).

Research Questions and the Questionnaire

This study intends to investigate the following questions: (1) How do students react

to the use of CMC involved in my teaching? (2) What positives and negatives do students find in using the CMC? (3) What suggestions do they make for improving such communication in the future? And (4) What factors may have contributed to students' reactions to the use of CMC?

To answer these questions, a questionnaire was designed for a survey which was administered at the end of the semester. For the first research question, I asked the students whether they were registered to the Blackboard™ course website; if yes, when they registered; how often they accessed the course website; more specifically, how often they used the discussion board function during the semester; whether they would use the virtual classroom function of the course website if help and guidance were provided; and finally, how effective, in their perception, the website was in facilitating their course learning.

For the second and third research questions, I asked open-ended questions to solicit students' answers. To answer research question four, I collected students' demographic information. I also hypothesized that the following factors may have contributed to their reactions to the CMC for the course learning: (1) their location of residence which makes it either easy or difficult to access computers on campus; (2) whether they have Internet access at their residence; (3) their habits and frequency in accessing the Internet and checking their personal e-mail box; and (4) their motivation in learning the course. To facilitate my understanding of the last factor, I asked the following questions: (a) Do you still have a hard copy of the syllabus for the course at this time of the semester? (b) How often do you refer to the syllabus for course policies and assignment requirements? (c) Do you keep handouts for this course provided during the semester? (d) Do you have

your own textbook? and (e) How much of the textbook do you read as class preparation?

RESULTS

R_1: How do students react to the use of CMC involved in my teaching?

In responding to the question, "How well do you think the course website facilitated your learning for the course," three reported it was excellent (4.3%), seven thought it was very good (10.0%), 14 thought it was good (20.0%), 23 thought it was just so so (32.9%), 12 thought it offered no help (17.1%), and 11 thought it offered no help and caused extra trouble (15.7%). In terms of using the Blackboard™ course website, three visited it on a daily basis (4.3%), 21 visited it about one or two times a week (30%), 31 visited it about one or two times a month (44.3%), and 15 almost never visited it (21.4%). In terms of using the discussion board, six used it more than three times during the semester (8.6%), 19 used it one to three times during the semester (27.1%), and 42 never used it (60%). When asked whether they would use the virtual classroom function of the course website if help and guidance were provided, 31 said "no" (44.3%).

R_2: What positives and negatives do students find in using the CMC?

Fifty-nine out of the 70 respondents (84.3%) offered comments to the question regarding the positives of the CMC in facilitating course learning. Among these, 48 (81.4%) thought the course website provided extra availability to (updated) information, such as handouts, information about class progress, study guide for tests, samples to illustrate assignments, and website links to help enhance their course learning. Eight respondents (13.6%) reported that they liked the discussion bulletin board which helped them to know their peers' views (e.g., about assignments) and develop electronic discussion skills. Also eight respondents (13.6%) reported that communication functions

such as e-mail, discussion board, and file exchange significantly facilitated the communication within their project group. Six respondents (10.2%) believed that use of the technology helped to prepare them for their professional future. Three (5.1%) said that information on the Blackboard™ course website is well-organized and thus easy to access desired course information.

In terms of the negatives that the participants experienced in using the course website, 54 responded with comments. Out of these respondents, 33 (61.1%) reported that it was difficult to log onto the password-protected website or to access information in some of the content areas, that the process of electronic registration was time-consuming, and that it was simply a nuisance for those without easy access to the Internet. Eleven respondents (20.4%) commented that they experienced some confusion either because they did not know where on the website to find certain desired information, or because there sometimes existed discrepancy between information on the website and information offered in class. Three respondents (5.6%) said that students were required too much to depend on the website for necessary information so that the website sometimes became the sole source for desired information. This was a hassle to those without easy access to the Internet or to those who have difficulty logging onto the password-protected website. Two respondents (3.7%) commented that they found nothing positive with the Blackboard™ course website, and that it was totally a negative experience. One comment (1.9%) indicated that synchronous communication tools on the website were inadequately used. Another comment (1.9%) indicated that information on the course website was not updated often enough.

R_3 What suggestions do students make for improving the CMC in the future?

Altogether 39 out of the 70 respondents offered comments to this question. Twelve (17.1%) said that the students should not be required to register to the course website, and that their activity with the website should not be made a part of their participation grade. Eight (11.4%) thought that access to the course website should be made easier. Several methods were suggested for this purpose. One, students should be able to access the course website without registering to it. Two, downloading from the Internet of on-campus computers should be much quicker. Three, use e-mail instead of the course website to make course information available to students. However, antithetical to these comments, seven (10.0%) thought that the whole class should be more clearly required to use or to increase their use of the course website, and that it should be ascertained that every student is registered to the course website at the very beginning of the semester. Six comments (8.6%) indicate that training about how to use the website (e.g., how to log onto the website and how to use various communication tools on the website) should be given at the beginning of the semester, that hard copies of instructions informing how to use the website should be provided, and that specific issues regarding the use of the course website should be discussed in class. Four respondents (5.7%) said that the course website was an extra hassle that provided no help to course learning and thus should be abolished altogether. Three respondents (4.3%) thought that more use should be given to the synchronous communication tools such as the virtual classroom; and that scheduling should be coordinated to facilitate the use of synchronous communication.

R_4 What factors may have contributed to students' reactions to the use of the Blackboard™-facilitated CMC?

Correlations of different strengths were found between students' reactions to the use of the CMC on one hand, and a variety of factors on the other hand. Pearson *r* values were used to test for correlations between, on one hand, respondents' perception of the effectiveness of the CMC, their frequency of accessing the course website and using the discussion board, and, on the other hand, their frequency of accessing the Internet and checking their e-mail, and their motivation for the course learning (as indicated by their frequency of referring to course syllabus for course policies and assignment requirements, and how much of the textbook they read as class preparation). Spearman *r* values were used to test for correlations between, on one hand, respondents' perception of the effectiveness of the CMC, their frequency of accessing the course website and using the discussion board, and whether they would like to use the virtual classroom on the course website, and, on the other hand, their sex, year in school, their residence location, and whether they have Internet access at their residence.

As seen in Table 1, the correlations between respondents' perception of the effectiveness of the CMC on one hand, and, on the other hand, their frequency of accessing the Internet, their frequency of checking their e-mail, their motivation for the course learning (as indicated by their frequency of referring to course syllabus for course policies and assignment requirements, and how much of the textbook they read as class preparation) are respectively $r\ (70) = -.293$, $p < .05$; $r\ (70) = -.312$, $p < .05$; $r\ (70) = .119$, $p > .05$; and $r\ (70) = .263$, $p < .05$. The correlations between respondents' frequency of accessing the course website on one hand, and, on the other hand, their frequency of

accessing the Internet, their frequency of checking their e-mail, and their motivation for the course learning (as indicated by their frequency of referring to course syllabus for course policies and assignment requirements, and how much of the textbook they read as class preparation) are respectively r (70) = .268, $p < .05$; r (70) = .382, $p < .01$; and r (70) = .277, $p < .05$; r (70) = .219, $p > .05$. No significant correlations were found between respondents' frequency of using the discussion bulletin board on one hand, and, on the other hand, their frequency of accessing the Internet, their frequency of checking their e-mail, and their motivation for the course learning (as indicated by their frequency of referring to course syllabus for course policies and assignment requirements, and how much of the textbook they read as class preparation).

Table 1
Correlations Represented by Pearson r Values

	Internet[4]		E-mail[5]		Course Syllabus[6]		Text Reading[7]	
	PCC[8]	Sig. Level[9]	PCC[8]	Sig. Level[9]	PCC[8]	Sig. Level[9]	PCC[8]	Sig. Level[9]
Effective[1]	.293*	.014	.312**	.009	.119	.326	.263*	.028
Course Website[2]	.268*	.025	.382**	.001	.277*	.020	.219	.068
Discussion Board[3]	.182	.131	.032	.795	.099	.416	-.209	.082

Note.

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

1. Respondents' perception of the effectiveness of the CMC via Blackboard ™.
2. Respondents' frequency of accessing the course website.
3. Respondents' frequency of using the discussion board.
4. Respondents' frequency of using the Internet.
5. Respondents' frequency of checking their e-mail.
6. Respondents' frequency of referring to course syllabus for course policies and assignment requirements.
7. How much the respondents read the textbook as class preparation.
8. Pearson correlation coefficient.
9. Significance level.

Table 2 shows the correlations, using Spearman *r* values, between, on one hand, respondents' perception of the effectiveness of the CMC, how often they access the course website, how often they used the discussion board during the semester, and whether they would use the virtual classroom function if help and guidance were provided, and, on the other hand, their sex, year in school, residence location, and whether they have Internet access at their residence.

The correlation between respondents' perception of the effectiveness of the CMC and their residence location is $r\ (70) = -.286$, $p < .05$. Since a smaller value in the response means a closer residence location to campus and yet a higher degree of satisfaction with the course website, this result signifies that the closer the student is to campus, the less effective the course website is in his/her perception. No significant correlation was found between participants' access to the Internet at their residence and their perception of the effectiveness of the course website. The correlation between, on one hand, respondents' frequency of using the discussion board during the semester, and, on the other hand, their sex and year in school, are respectively $r\ (70) = .262$, $p < .05$; and $r\ (70) = -.378$, $p < .01$.

No significant correlations were found (1) between respondents' perception of the effectiveness of the CMC, on one hand, and, on the other hand, their sex, year in school, and whether they have Internet access at their residence; (2) between respondents' frequency of accessing the course website, and whether they would use the virtual classroom function if help and guidance were provided, on one hand, and, on the other hand, their sex, year in school, residence location, and whether they have Internet access at their residence; and (3) between how often they used the discussion board during the semester, on one hand, and, on the other hand, their sex, residence location, and whether

they have Internet access at their residence. However, significant correlations were found between, on one hand, respondents' perception of the effectiveness of the CMC, and, on the other hand, their frequency of accessing the course website, and whether they would use the virtual classroom function if help and guidance were provided. The correlations are respectively r (70) = .469, $p < .01$; and r (70) = .376, $p < .01$.

Table 2
Nonparametric Correlations Represented by Spearman r Values

	Sex		Year in School		Resid. Location[5]		Internet Access[6]	
	PCC[7]	Sig. Level[8]	PCC[7]	Sig. Level[8]	PCC[7]	Sig. Level[8]	PCC[7]	Sig. Level[8]
Effective[1]	.163	.178	-.198	.100	-.286*	.016	-.092	.450
Course Website[2]	.185	.124	-.102	.401	-.151	.212	.123	.311
Discussion Board[3]	.262*	.029	-.378**	.001	-.370	.002	-.274	.022
Virtual Classroom[4]	-.162	.181	-.126	.297	-.200	.096	-.021	.862

Note.

*. Correlation is significant at the 0.05 level (2-tailed).
**. Correlation is significant at the 0.01 level (2-tailed).
1. Respondents' perception of the effectiveness of the computer-mediated communication via Blackboard ™.
2. Respondents' frequency of accessing the course website.
3. Respondents' frequency of using the discussion board.
4. Whether the respondents would use the virtual classroom function if help and guidance were provided.
5. Respondents' residence location.
6. Whether the respondents had Internet access at their residence.
7. Pearson correlation coefficient.
8. Significance level.

DISCUSSION

R_1: How do students react to the use of CMC involved in my teaching?

There seems to be an obvious discrepancy between what is generally contended by CMC literature and my students' perception of the effectiveness of CMC in facilitating course learning. The percentage of students perceiving CMC as good, very good, or excellent for instructional purposes (34.3%) is much lower than what I expected, with consideration of the contention in general CMC research literature. The majority of the students (65.7%) believed that it was just so-so, offered no help for their course learning, and even caused them extra trouble.

Despite the fact that 95.7% of the students were registered to the course website, and 92.9% of them were registered in the first quarter of the semester, their use of the course website, especially the CMC functions on the course website, was, in balance, rather inadequate. To my knowledge, there are at least seven computer labs on this medium-sized campus where students can access the Internet, and, as seen from the survey results, 80% of the students have Internet access at their residence. It takes generally no more than half a minute to get into the course website, as informed by my own experience. However, almost half of the students (44.3%) only accessed the course website about one or two times a *month*. More than one-fifths of them (21.4%) almost never used the course website. This is far from sufficient considering the fact that I updated information on the course website several times a week, and that students' activity with the course website constituted one portion of their course grade. At least twice during the semester, I invited all the students to post, onto the discussion board, their messages on certain topics and offered them written instructions about how to do this. Against this backdrop, students' use of the discussion board was extremely insufficient when 60% of them responded that they almost never used the discussion board. And almost half of the students (47.1%)

either would not use or were not sure whether they would use the virtual classroom even if guidance and help were provided.

In short, different from what is informed by general CMC literature and much incompatible with my expectations as advised by the prevalence of Internet access, the students' perception of the effectiveness of instructional CMC was rather negative, and their use of CMC was very insufficient.

R_2 & R_3: What positives and negatives do students find in using the CMC?

What suggestions do students make for improving the CMC in the future?

The most conspicuous positive about the instructional CMC, in students' perception, was the added access to course information. This was especially a benefit for those who lose hard copies of course handouts. CMC instruments such as the discussion board and electronic mail facilitated students' cooperation and communication with their peers or project group members. With such benefits, some students feel that more students should make more use of the course website. However, many other students found it a "hassle" to register to the website or to wait for the downloading from the Internet. Some do not have access to the Internet and find it an inconvenience to make the trip to computer labs. To encapsulate, it seems that, on one hand, students espouse the benefits that technology can provide, yet, on the other hand, they take aversion to the learning and effort that the adoption of technology would necessitate. Such mentality may not be very logical and realistic, but practical difficulty must not be ignored in the espousal of CMC.

So what is the way out? People with difficulty in access did not like the idea that they had to depend on the course website for necessary information and communication. They strongly hold that the CMC be made supplemental rather than indispensable. They

thought that communication in the classroom should still be the mainstay. According to these people, easy accessibility to the Internet and high-speed connection are preconditions for effective use of CMC. However, some students thought that the barrier is not difficult accessibility, but indolence on the part of the students. According to these "technology proponents," the remedy should lie more in mandatory use of CMC and better scheduling among group members for the purpose of synchronous communication. Whatever the contention, it seems that adoption of CMC needs to be approached systematically with consideration to a spectrum of factors, including Internet connection speed, degree of accessibility, and ease in usability. Premature adoption of CMC is likely to produce frustration due to "extra hassle."

R_4 What factors may have contributed to students' reactions to the use of Blackboard™-facilitated CMC?

As revealed by findings for this research question, respondents' perception of the effectiveness of CMC is significantly correlated with the frequency of their using it. Yet the correlation here is two-tailed. There is no telling which one contributed to which. Yet, practically speaking, incentives for increased use of CMC seem helpful and promising. As mentioned previously, consideration and preparation of factual conditions would certainly facilitate the motivation of increased use of CMC. The significant correlation between perception of effectiveness and the willingness to use CMC in the future indicates that participants' present experience can be crucial in their decision for future use of CMC. There is also an interesting and highly significant positive correlation between the frequency of participants' use of CMC and their frequency in checking personal e-mail box. The implication may be that CMC, to many, is more a matter of

habit than a matter of motivation. This is especially so with consideration to my clear statement to the students that their activity with the course website would constitute one portion of their course grade.

In terms of demographic factors that may influence participants' use of CMC, there is no significant correlation between, on one hand, participants' frequency of CMC use and their willingness to use the virtual classroom in the future, and, on the other hand, the participants' sex, year in school, residence location, and accessibility to the Internet at their residence. However, there does seem to be a significant correlation between participants' use of the discussion bulletin board on one hand, and, on the other hand, their sex, year in school, residence location, and accessibility to the Internet at their residence. Male students have a greater tendency to use the discussion bulletin board. It is not clear, at this moment, why it is so. The further into their college career, the more likely the students are to use the discussion bulletin board. The implication of this finding may be that freshmen need more training in and thus more familiarity with CMC to motivate increased use of CMC on their part.

As another finding, the further away from campus the students live, the more likely they are to use the discussion bulletin board. This may appear puzzling at the first sight, yet it corroborates the previous finding in that most juniors and seniors live off campus. Finally, in conformity with common sense, students with access to the Internet at their residence are more likely to use the discussion bulletin board. However, the question puzzling to me is, "Why there is no significant correlation between participants' frequency of using the course website and their demographics while there is a significant

correlation between their use of the discussion bulletin board and their demographics?" The answer to this question awaits further investigation.

The generalizability of the findings of every study may have a limitation because of, for instance, the size and type of the subject population and the way the investigation is executed. In this study, all the subjects were my own students. It is not ascertained how much my manner of facilitating the use of CMC technology contributed to students' reactions. The CMC in this study was not the indispensable channel of instruction, but served as a supplement for the classroom instruction. These factors will certainly cause limitation to the generalizability to the findings of this study.

CONCLUSION

This study revealed findings which largely do not corroborate what is contended in the bulk of CMC literature. It does not seem that students embrace CMC with ready willingness since they do not perceive CMC as effective as what is suggested in general CMC literature. Due to the fact that CMC technology is receiving great espousal and investment, the following question must be given more caution, "Is technology being embraced more because of its newness, novelty, and increasing popularity as the mode of life, or more because of its bettering our life and education to a genuinely new level of effectiveness?"

This study also revealed many practical difficulties involved in the use of CMC technology. Attention to such difficulties must become an integral part of investment in technology. Acquisition, installation, and availability of technology are far from the complete fulfillment of technological investment. Incorporation of technology must be

done in such a manner that it becomes an embedded part instead of an imposed intrusion in the life mosaic of the participants.

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